**Herbal Formulations in Management of Dermatitis**

**ABSTRACT**

Dermatitis, a persistently harmful skin condition, impacts millions of people globally. Redness, itching, and skin lesions are the hallmarks of dermatitis. The need for innovative approaches to therapy is highlighted by the significant side effects and poor efficacy of indigenous treatments, such as topical corticosteroids and immunomodulators. Herbal compositions offer a natural way to treat dermatitis. The compilation of the most recent information on the mechanisms, safety, and longevity of herbal formulations for the treatment of dermatitis is the aim of this thorough and extensive review. Collectively it indicates that skin lesions, irritation, and itching may be substantially minimized by using such medicines that comprise ingredients like turmeric, mango, ginkgo, and aloe vera, among others. These medications are a viable alternative to conventional medicines because of their typically good tolerance and minimal adverse reactions. The mechanisms behind the therapeutic advantages of herbal remedies in dermatitis include wound healing, antioxidant action, preventing microbial multiplication, and altering inflammatory cascades. These formulations contain bioactive compounds such as flavonoids, phenolic acids, and terpenoids that have been responded to skin disorders associated with dermatitis. This review highlights the potential of Phyto-pharmaceutically tailored herbal formulations as a secure, all-nature, and effective alternative to treat dermatitis. More studies are timely demand better understanding the mechanisms of action and to standardize the production and quality control of natural means in different dermatological treatments.

**KEYWORDS:** herbal formulations, dermatitis, natural remedies, wound healing, inflammation, antioxidant activity.

**1. INTRODUCTION**

"Dermatitis” is dubbed with inflammation of the skin accompanying erythema and discomfort. The term "dermatitis" pertains to a gamut of skin rashes and irritations triggered by a myriad of impacts, such as allergies, irritants, a hyperactive immune system, and heirlooms. Combining the words "derm" for skin and "itis" for inflammation, it results in the term "dermatitis." Contact dermatitis, atopic dermatitis, seborrheic dermatitis, and nummular dermatitis comprise the four categories of dermatitis. In contrast to atopic dermatitis, which is a pervasive, itchy skin condition that afflicts these individuals with asthma, high fevers, and a family history of them, contact dermatitis is a rash brought on by direct liaison with a tailored substance. The chronic illness known as seborrheic dermatitis is typified by red, flaky, scaly, and itchy skin. A coin-shaped rash and inflammation, nummular dermatitis is typified by tiny blisters, scabs, and scales (Kimber et al.,2002; Bonamonte et al.,2013).

Erythema, vesicles, pruritus, persistent irritation, scratching, and skin thickening are all manifestations of dermatitis, which is exacerbated by the skin's inflammatory reaction. Utilizing non-prescription skin lotion, applying cool, damp dressings, avoiding local irritation, and utilizing corticosteroids and anti-pruritic are all aspects of the treatment. Since ancient times, people have utilized herbal remedies to treat skin constraints. A return to organic produce, a spur to reengage with nature, the use of natural medicines as part of the green revolution, and the realization of the negative effects of chemical pharmaceuticals have all contributed to the current revival of herbal use. Patients are increasingly using herbal treatments, particularly those for skin conditions. Aloe Vera, Neem, Tulsi, and other plants are used to cure dermatitis. Topical dosage forms are creams, gels, ointments, pastes, suspensions, and solutions that contain one or more active chemicals that have been dissolved or equally split in a feasible framework. The dosage form design is chosen based on the intended therapeutic effect and the stipulate of the disease (Lachman et al., 1991).

The choice of excipient is mostly determined by the dosage form being designed, which is the most important step in the development of a topical dosage form since it ascertain the final product's qualities, which directly affect the effectiveness of the active ingredient and the aesthetics of the product (Banker et al., 1979). Over the past several decades, pharmaceutical research has become a lot more intrigued in skin formulation (Topical Semisolid Dosage form) due to better comprehension of skin morphology and penetration route (Chater, 2001; Aulton, 1995).

In this article an attempt has been made to review and evaluate current herbal alternatives in the management and treatment of dermatitis. Several keywords such as herbal formulations, dermatitis, natural remedies etc. had been employed to fetch relevant findings in this context. Further, few additional phrases like wound healing, inflammation, antioxidant activity etc. had also been utilized to make the study more relevant and appropriate.

**2. TREATMENT APPROACHES IN DERMATITIS**

1. By controlling the inflammatory response, coordinating immune system activities, and boosting antioxidant activities, herbal medicine and its active components illustrate both safeguarding and therapeutic aptitude against dermatitis (Alenazi, 2023).
2. Scientific evidence endorses the safety and efficacy of natural products, such as flavonoids, alkaloids, terpenes, glycosides, and other chemicals, in the treatment of dermatitis (Sasseville, 2008).
3. By trimming inflammation through anti-inflammatory compounds like flavonoids, tannins, and polysaccharides that can hinder the release of inflammatory mediators like histamine and cytokinin, herbal formulations may be able to help manage contact dependent dermatitis. This will help to soothe irritated skin and lessen redness and itching (Bonamonte et al., 2013). In order to combat oxidative stress, which contributes to skin damage in contact dermatitis, several herbs also have antioxidant qualities (Slodownik et al., 2008).
4. Herbal resources for seborrheic dermatitis predominantly works by implementing their antifungal competencies to target an abundance of Malassezia yeast, a major cause of the state of affairs, while also providing anti-inflammatory effects to mitigate redness, itching, and resizing. These effects are frequently retrieved by using substances like flavonoids, terpenes, and phenolic acids (Tao et al., 2021; Adalsteinsson et al., 2020).

**3. ROLE AND IMPORTANCE OF PHYTOCONSTITUENTS**

Herbal remedies are more effective in acute and chronic diseases which have fewer side effects, and are more reasonably priced; they have become the alternative implementation for the treatment and management of skin disorders (Malik et al., 2019). The chemical constituents contribute to a basic metabolic process separates them into primary and secondary metabolites. Primary metabolites usually indicate the basic biological behaviours that make them equivalent in all living cells, whereas secondary metabolites follow secondary pathways and can be the main ingredients in pharmaceutical production (Hussein et al., 2019). Because of the way plant-based compounds functioning, professionals were enthusiastic in developing natural needs to cure a range of conditions, most notably skin constraints. Patients can utilise supplements to treat and alleviate skin issues such as C and E, tea tree oil, and honey. These can restore skin health and reduce the symptoms of skin conditions. The overview aims to provide recent studies on the effects of natural compounds, such as mangiferin, lutein, curcumin, resveratrol, embelin, naringenin, quercetin, gingerol, and apigenin, on dermatological disorders (Petrova et al., 2011; Samraj et al., 2014). Numerous natural species have particular chemical components and Figure 1 is showing the maximum available chemical component presenting plant source.

*Embelia ribes Burm*

quercetin

apigenin

naringenin

resveratrol

lutein

*Zingiber officinale*

*Veratrum grandiflorum*

*Tanacetum genera*

*Ginkgo biloba*

*Terminalia brownii*

*Curcuma longa*

*Galittm aparine*

*Mangifera indica*

gingerol

embelin

curcumin

mangiferin

**DERMATITIS**

**Fig. 1**. **Scientific names and sources of natural products reported against dermatitis**

**4. ELABORATION OF VARIOUS NATURAL PRODUCTS AGAINT SKIN DISORDERS**

**4.1 Mangiferin**

A well-known substance called Mangiferin is mostly derived from the Anacardiaceae family's *Mangifera indica* (mango). It has potent chemo-preventive, anti-inflammatory, and antioxidant properties. In addition, Mangiferin has hepato-protective and gastro-protective effects, is used as a lipid-lowering drug, and has antimicrobial, antipyretic, antiviral, and antibacterial qualities (Ochocka et al., 2017).

**4.1.1 Activities on skin**

Mangiferin has significant impact on skin aging, enabling it to avoid wrinkles and irritation. The most prevalent inflammatory skin condition is contact dermatitis, which can be difficult to treat because it results in skin lesions and the breakdown of the skin barrier. Mangiferin is highly effective at promoting skin recuperation and wound healing (Pleguezuelos-Villa et al., 2019). For skin cancers or melanoma, mangiferin is advantageous owing to its anti-angiogenic activity, which can prevent tumours from producing their own blood cells. Mangiferin is additionally acceptable to treat human herpes viruses, such as the herpes simplex virus (HSV), and bacteria that cause skin infections (Jie et al., 2004).

**4.1.2 Mechanism of Actions**

1. By blocking elastase, collagenase, and water loss, mangiferin helps protect the skin and prevent wrinkles, which are induced by exposure to sunlight that contains ultraviolet (UV) B or UVR radiation. Mangiferin can strengthen the collagen bonds in the skin, shielding it from harmful UVB rays (Tundis et al., 2015).
2. Oxidative stress triggers a decrease in collagen, which contributes to skin ageing. The matrix-degrading enzyme matrix metalloproteinase (MMP) is inclined to act when collagen degradation occurs. The ageing process of the skin is accelerated by the rise in MMP activity, which causes photoaging. Despite the fact that there are numerous varieties of MMP, MMP-1 is crucial and accountable for the oxidative stress-induced reduction of collagen, which is controlled by JUN-N-terminal kinases (JNK) and extracellular signal-regulated (ERK). When hydrogen peroxide is applied to human epidermal keratinocyte line (HaCat) cells, mangiferin inhibits the MEK and SEK pathways in alongside hindering the ERK and JNK pathways, which in turn prevents the expression of MMP-1. Mangiferin, however, suppresses MMP-9 activity, which is similarly produced through the ERK and MEK pathways (Kim et al., 2012).
3. Mangiferin improves wound healing and skin inflammation while lowering transcutol-P (TPA)-induced skin damage (Pleguezuelos-Villa et al., 2019).
4. When mangiferin is executed, it also suppresses the consequences of inflammatory mediators including tumour necrosis factor alfa (TNF-α) and its precursors like inducible nitric oxide synthase (iNOS), interleukin (IL)-1β, and IL-6 that cause dermatological conditions like dermatitis and psoriasis (Zhao et al., 2017).
5. Mangiferin shows promise as an antioxidant. Through promoting fibroblast migration and cell proliferation amid the wound healing process and decreasing myeloperoxidase (MPO) activity, an enzyme entangled in inflammation, it accelerates wound healing closure.
6. Mangiferin's anti-angiogenic effect can prevent tumours from generating their own blood cells, which is why it is beneficial for skin cancer or melanoma. In addition, according to Ingenuity Pathway analysis (IPA) enrichment, mangiferin inhibits the expression of IL6, TNF, PLAU, kinase insert domain receptor (KDR), vascular endothelial growth factor receptor 2 (VEGFR2), interferon gamma (IFN-γ), fibroblast growth factor 1 (FGF1), chemokine ligand 2 (CCL2), MMP19, and placental growth factor (PGF) to hinder angiogenesis, metastasis-invasion motility, cell number growth, and viability in cancer signalling processes (Delgado-Hernández et al., 2020).

**4.1.3 Various formulations with drug delivery system**

1. Mangiferin, taken orally, minimises the aging-causing wrinkles mediated by UVB rays (Song et al., 2013).
2. Mangiferin nano emulsions are utilised to address skin regeneration and inflammatory ailments (Pleguezuelos-Villa et al., 2019).
3. The hydrogel delivery mechanism of mangiferin facilitates the growth of skin flap regeneration and increases survival.
4. Mangiferin is an electrospray nanoparticle designed to combat integumentary disorders (Mao et al., 2019).

**4.2 Quercetin**

Fruits, vegetables, tea, spring onions, tomatoes, grapes, apples, brassica, berries, and onions are all natural sources of quercetin. The herb that possesses a majority amount of quercetin is *Ginko biloba*, which is a member of the Ginkgoaceae family. Flavonoids encompass quercetin. Furthermore, the most prevalent form of quercetin is rutin, which is predominantly glycosylated, whereas aglycone is a yellow sugar-free structure of quercetin (Ulusoy et al., 2020). In regard its anti-inflammatory and antioxidant attributes, quercetin has been revealed in countless studies to have anti-tumour, antibacterial, anti-angiogenic, anti-diabetic, anti-obesity, and anti-allergic rentals. It is also aiding for neurological and cardiovascular instances (Yang et al., 2020).

**4.2.1 Activities on skin**

Quercetin has anti-inflammatory and anti-aging capabilities. The cell endurance, expansion, and survival of fibroblasts are similarly impacted. One of its anti-cancer qualities is that it can help retard the proliferation of tumours and reduce cell invasion (Brown et al., 2011). Dermatological conditions that impact quality of life include cellulitis, folliculitis, impetigo, furuncles, and erysipelas. Inhibiting *Staphylococcus aureus, Enterococcus faecalis, Pseudomonas aeruginosa, Streptococcus mutants,* and *Escherichia coli* through numerous avenues, quercetin possesses antibacterial attributes against distinct pathogens. It is also beneficial in Atopic dermatitis (prolonged erosion of the skin and inflammation), as well as contact dermatitis (an allergic reaction on the dermis that causes eruptions and distress) (Weng et al., 2012). This phytoconstituent promotes wound healing due to its anti-inflammatory and antioxidant activities, and it may mitigate keloid, an extensive dermal scar triggered by skin trauma. An *in vitro* study points to the combination of quercetin with supplements such as morin and rutin, along with the use of some antibiotics, is synergistic against MRSA (Unahabhokha et al., 2015).

**4.2.2 Mechanism of Actions**

1. In human skin, quercetin suppresses the breakdown of collagen, COX-2, and MMP-1 induced by UV radiation. Also, owing to PKC-delta (PKCδ) and Janus kinase-2 (JAK2) are fundamental regulators of inflammation; quercetin protects the skin against UV-induced skin ageing by suppressing these two aspects (Shin et al., 2019).
2. One pertinent factor in quercetin's anti-aging properties is its inhibition of AP-1 and NF-κB activation.
3. The Nrf2 pathway allows quercetin to trigger the proteasome, which intensifies the antioxidant effect and aids prevent skin withering (Sajadimajd et al., 2020).
4. By reducing cyclin D1 and MMP-2 production, quercetin may hinder the triggering of signal transducer and activator of transcription (STAT3) via IL-6. This dampens cell proliferation thru cell aggregation, especially at the S and G2/M stages.
5. Quercetin can be beneficial in tackling melanoma by grabbing edge of tyrosinase expression, promoting p53 expression, and regulating ROS, which ultimately results in cell death and apoptosis (Vargas et al., 2011).
6. Quercetin prevents atopic dermatitis by limiting pro-inflammatory aspects and inflammatory cytokines.
7. By reducing IL-6, IL-8, and TNF-α, quercetin prevents contact dermatitis and photosensitivity, revealing its potency as a mast-cell inhibitor.
8. Quercetin seeps into the fibroblast, a deeper layer of membrane which is the prime focus for wound healing, making a good quercetin formulation that can aid boost skin penetration a must.
9. By inhibiting the transfer of Smad's complex (Smad2/3/4) and transforming growth factor-beta (TGF-β), quercetin can ameliorate keloid, a severe dermal scar caused by skin wreckage (Hatahet et al., 2016).

**4.3 Curcumin**

Originating from turmeric, or *Curcuma longa*, curcumin is an ingredient of the Zingiberaceae family. Curcumin, or more precisely, diferuloylmethane (75%), desmethoxycurcumin (20%), and bisdemethoxycurcumin (5%), are curcuminoids abundant in turmeric. Meanwhile to getting used as an antimicrobial, additive, and anticancer agent, curcumin is also used to treat autoimmune diseases, respiratory conditions, depression, premenstrual syndrome, dyslipidaemia, osteoarthritis, diabetes, metabolic syndrome, endothelial dysfunction, non-alcoholic fatty liver disease, and hyperuricemia. Furthermore, curcumin possesses anti-inflammatory and antioxidant qualities. When it comes to dermatitis, curcumin does wonders.

**4.3.1 Activities on skin**

One useful and successful treatment for psoriasis depends on curcumin. Curcumin can be used in phototherapy for psoriasis because it is phototoxic at low concentrations against *Salmonella typhimurium* and *Escherichia coli* (Aggarwal et al., Heng et al., 2000). Additionally, curcumin works well against eczema or atopic dermatitis, reducing and improving dermatitis symptoms like thickness, erythema, scaling, and itching (Rawal et al., 2009). When used in a cream containing turmeric and sandalwood oils, this phytoconstituent can lessen radiodermatitis. After two weeks of dosing, curcumin relieves the skin damage and lessens the intensity of illuminated skin. Curcumin is beneficial in mending wounds spurred on by inflammation and oxidative damage. Its antioxidant activity triggers the cytoprotective signalling, and it suppresses lipid peroxidation, safeguarding the skin from oxidative stress. Additionally, curcumin confers human fibroblasts and keratinocytes some protection against hydrogen peroxide (Phan et al, 2001). Curcumin improves with skin ageing, particularly in older adults. It succeeds well against fungal and bacterial infections as well. Curcumin illustrates impact against methicillin-resistant *Staphylococcus aureus* (MRSA) when stipulated separately and displays some synergistic benefits when consumed in combination with other antibiotics. Curcumin is operative concerning *Acne vulgaris* (Mun et al., 2013).

**4.3.2 Mechanism of Actions**

1. Curcumin suppresses inflammation by a direct latching mechanism that impedes with TNF-α and its receptor's signal transduction. Curcumin gel can also prevent imiquimod-induced inflammation that resembles psoriasis by blocking TNF and specific interleukin (IL) such as IL-22, IL-1β, IL-17A, and IL-17F.
2. 2. By inhibiting NF-κB signalling, which emits inflammatory cytokines, it blocks the endosomal toll-like receptor (TLR), assisting to cause psoriatic inflammation. This diminishes the levels of IL-17 and IL-22 (Lai et al., 2017).
3. *Curcuma longa* is one of the herbs incorporating p-hydroxycinnamic acid (HCA), a phytocomponent that may tweak the protein kinase C-θ (PKC-θ) pathway by hindering PKC-θ from being phosphorylated. This can have an immunosuppressive effect on T-cells whilst avoiding the activation of T-cells triggering the development of various autoimmune disorders, including dermatitis (Vollono et al., 2019).
4. It also dampens inflammation by decreasing the transcription factor protein-1 (AP1), and NF-κB, as demonstrated in a wound model, lowers the expression of inflammatory cytokines and modifies the expression of pro-inflammatory gene products.
5. *C. longa*'s hot water extract prevents the rise in UVB-induced TNF-α and IL-1β as well as the elevated hyaluronan production that comes with ageing and contributes to dry skin.
6. In mouse keratinocyte cell lines, curcumin decreases the phosphorylation of the insulin receptor substrate-1 (IRS-1), S6K, AKT, and 4EBP1 receptors. This suggests that curcumin has an anticarcinogenic effect by inhibiting IGF-1 signalling (Asada et al., 2019).
7. By inhibiting STAT3 expression and the signalling pathway, a high curcumin dosage reduces the invasion of squamous cell A431 cells.
8. In an intradermal infection model, this component, a photosensitiser, is employed in photodynamic treatment to combat MRSA infection.
9. By generating reactive nitrogen species (RNS) and ROS linked to fungal death through apoptosis, curcumin nanoparticles prevent fungal growth (Almeida et al., 2017).

**4.3.3 Available marketed formulations**

1. Oral curcumin C3 Complex has the ability to lower the severity score of radiation dermatitis (radiodermatitis) and moist desquamation.
2. Herbavate® is a herbal extract cream that contains curcumin and can reduce and improve dermatitis symptoms such as itching, scaling, thickening, and erythema.
3. Vicco® is a curcumin cream that contains turmeric oil and sandalwood oil and is used for radiodermatitis (Vaughn et al., 2016).
	1. **Lutein**

Lutein, a lipidsoluble compound from the xanthophyll family of carotenoids, is derived from the leafy part of *Tagetes erecta* and *Galittm aparine* flowers. It is also found in dark and leafy green vegetables and is primarily used to treat cataracts and agerelated macular degeneration (AMD). It also has some positive consequences on the connective tissue (Shao et al., 2006).

**4.4.1 Activities on skin**

Some anti-inflammatory qualities have been demonstrated by lutein. It has been demonstrated that lutein and zeaxanthin are beneficial to the skin for improving its colour, tone, and brightness. Additionally, lutein shields the skin from UV rays from the sun, which damages skin. Lutein is an excellent treatment for a number of skin conditions, including photo dermatoses, oxidative stress, premature ageing, and skin ageing, which can lead to a skin rash. Zeaxanthin and lutein lengthen the tumour-free survival period, which is the period of time after the initial cancer therapy is finished when the patient has no more cancer indications and their tumour has shrunk in size and diversity. Psoriasis and cutaneous erythema are two conditions that lutein can reduce. With the growth of blood vessels, it has a wound-healing function (Souyoul et al., 2018; Balić et al., 2029).

**4.4.2 Mechanism of Actions**

1. Lutein can protect against gene expression caused by UVA, UVB, and UVA1 on individual skin. While oxidative stress and photo dermatoses, which can result in skin rash, are indicators of premature ageing, lutein and tomato nutrient complex offer a good defence against UVR that damages skin.
2. Lutein and zeaxanthin can elevate the processing of hyaluronan, which is useful in wound healing. Non-sulphate glycosaminoglycans with wound healing condominiums can hydrate the skin and have a high-water binding capacity due to a hyaluronan component.
3. Carotenoids can improve skin elasticity, hydration, and boost surface lipids by reduce UV radiation which produce skin damage. Both topical and oral administration routes can endorse the skin condition, especially in skin ageing (Balić et al., 2019).
4. Sun exposure causes inflammation of the skin, where damaging UVA and UVB rays can lower serum and skin carotenoid levels and induce oxidative stress. Furthermore, whereas long wave length UV, like UVA1, produces gene expression that results in skin erythema, short wavelength UV, like UVA and UVB, induces oxidative stress. By filtering UV rays, lutein can improve skin health and reduce skin rash, also known as skin erythema (Aziz et al., 2020).
5. By preventing sunburn cells from forming and reducing epidermal hyper-proliferation, lutein and zeaxanthin help to relieve sunburn.
6. Skin cancer is a deadly skin condition. One is squamous cell carcinoma (SCC), and the other is basal cell carcinoma (BCC). Both have high incidence rates in the US, Europe, and Australia. Skin cancer is typically caused by UV radiation, which 1) damages DNA and the immune system and 2) can create free radicals with prolonged exposure to sunshine. As a result, antioxidants can help shield the skin from ultraviolet light. Similar to β-carotene, lutein is a potent antioxidant that can protect skin from UV-induced oxidative damage (Heinen et al., 2007).
	1. **Apigenin**

Apigenin is a glycoside that belongs to the flavonoid class and primarily contains aglycones. It is mostly found in species of the Lamiaceae (which includes *Siderites* and *Teucrium*) and Fabaceae (which includes *Genista*) and Asteraceae (which includes *Artemisia*, *Matricaria*, *Achillea*, and *Tanacetum* genera). Furthermore, apigenin, in its glycosylated form, is present in vegetables like celery, parsley, and onion; herbs like thyme, basil, chamomile, and oregano; and plant-based drinks like wine, tea, and beer. Red and white sorghum, oranges, wheat sprouts, rutabagas, cilantro, and kumquats are other sources of apigenin (Zari et al., 2015). The biological activity of apigenin, which include antioxidant, anti-tumour, anti-allergic, anti-inflammatory, cardioprotective, neuroprotective, antibacterial, and anti-genotoxic properties, are good and its toxicity is minimal. Additionally, it can provide protection against hypertension, autoimmune myocarditis, cardiac hypertrophy, and antidermatitic. It additionally exhibits antihyperglycemic, antiapoptotic, anti-atherogenic, and antiparasitic properties.

**4.5.1 Activity against dermatitis**

Apigenin aids in the treatment of skin cancer. Psoriasis and eczema can be effectively treated by reducing inflammation. This chemical component reduces dermatitis, which slows down the ageing of the skin (Kiraly et al., 2016).

**4.5.2 Mechanism of Actions**

1. Apigenin inhibits cell division and cell cycle progression while activating AMP-activated protein kinase (AMPK) to treat skin cancer.

2. It can reduce skin malignancies by lowering the production of COX-2, EP1, EP2, and PGE2, increasing terminal differentiation, and inhibiting cell proliferation (Imran et al., 2020).

3. By inhibiting Akt (protein kinase B) and mTOR signalling, apigenin suppresses dermatitis cancer.

4. By demethylating the Nrf2 gene promoter, this phytoconstituent prevents skin cancer.

5. By lowering DNMT epigenetic proteins and HDAC, inhibiting UVB-induced carcinogenesis because of TSP1, enhancing permeability barrier homeostasis, and raising the mRNA level in lipid synthetic enzymes, filaggrin, and lamellar body production, it can aid in preventing the development of skin cancer.

6. Apigenin aids to cure inflammatory diminution such psoriasis and eczema by suppressing the inflammatory cytokines owing to TSP1.

7. It can minimise skin aging by lowering of skin harshness and alleviate the fine cracks and wrinkles due antioxidant activity (Zari et al., 2015).

**Table 1. Various plant sources with their activities on dermatitis** (Chithra et al.,1998; Christenson et al., 1981; Poltanov et al., 2009; Olmedo et al., 2013; Griere, 1992; Katiyar et al., 2000; Gediya et al., 2011; Callen et al., 2007; Armstrong et al., 1999; Benzie et al., 2011)

|  |  |  |  |
| --- | --- | --- | --- |
| **Plants Name** | **Biological Sources** | **Uses on skin** | **Herbal Formulations** |
| Aloe-vera | *Aloe barbadensis*, Liliaceae | Anti-Inflammatory | Gel, Scrub |
| Sandalwood | *Santulum album* ,Santalaceae | Anti-Inflammatory | Oil |
| Amla | *Emblica officinalis* , Phyllanthaceae | Anti -oxidant | Scrub |
| Rosemary | *Rosmarinus officinalis ,* | Anti- ageing | Oil |
| Papaya | *Carica papaya*, caricaceae | Depigmentation Effects | Face wash |
| *Cucumber* | *Cucumis sativus*,Cucurbitaceae | Anti- wrinkle, Anti- oxidant | Sheet masks and Gel |
| Carrot | *Daucus carota* , apiaceae | Anti- aging | Packs and Lotions |
| Neem | *Azadirachta indica* , meliaceae | Antiseptic, anti-acne | Toothpaste, soap, shampoo, balms |
| Oat, Shofan | *Avena sativa* , Poaceae | Treatment of eczema, wounds, irritation, inflammation, erythema, burns, itching, sunburn | Cream |
| Chamomile, Babuna | *Matricaria chamomilla,* Asteraceae | ointment or cream  | ointment or cream  |

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**Fig. 2. Mechanism of actions of some phytoconstituents against dermatitis**

**5. Potential and Difficulties of Natural Products in different delivery systems**

There are conventional transdermal formulations, such as ointments, creams, and lotions, but they have certain limitations too, like being sticky, not being spreadable, and having stability problems, all of which lead to non-compliance. Transdermal dissemination has advanced to the point where more effective and patient-compliant transparent gels and emulgels have been created. As a result, both the pharmaceutical and cosmetics industries are experiencing an increase in the use of these formulations. The literature claims that by rupturing the lipid bilayer and extending their retention at the site of action, topical formulations with nanoscale particles can improve the permeability of natural substances (DeLouise, 2012). Nowadays, some of the most significant nano-formulations utilised for cutaneous and dermatological applications of phytomedicines are polymeric nano micelles, ethosomes, niosomes, liposomes, lipid nanoparticles, phytosomes, nano emulsions, transferosomes, niosomes, β-cyclodextrin complexes, and phytosomes (Jeevanandam et al., 2016). The low viscosity and spreadability of nano emulsions tend to limit their potential to augment the accessibility of endogenous constituents over simple micellar solutions and to provide greater thermodynamic stability when compared to unstable dispersions such as emulsions and suspensions. Water-in-oil (w/o) or oil-in-water (o/w) nano emulsions with a gelling agent are known as nanoemulgels. In contrast to alternative carriers like solid lipid nanoparticles, liposomes, or microemulsions, nanoemulgels offer a number of benefits, such as improved drug-loading ability, less skin irritation, and enhanced permeability (Huang et al., 2010). There have been several methods employed in the development of nano phytomedicines. The methods include salting out, solvent emulsification-diffusion, complex coacervation, nanoprecipitation, co-precipitation, and self-assembly. Notwithstanding the promising results of nano formulations of natural goods, it is crucial to conduct a comprehensive evaluation of their safety, taking into account any potential toxicity to the phytomedicine or an aspect of the nano system. The negative aspects of natural products in the creation of skin formulations to treat a range of skin conditions could be addressed by any of the ways mentioned (Kalani et al., 2011).

**6. CONCLUSION**

Herbal remedies are a viable substitute for the attitudes of dermatitis, enabling a safe, natural, and efficient means of reducing symptoms and enhancing skin health. The anti-inflammatory, antioxidant, and antibacterial qualities of the bioactive aspects found in many herbs make them a desirable choice for the treatment of dermatitis. Significant effectiveness has been proven by herbal formulations in lowering dermatitis-related skin lesions, irritation, and itching. In general, herbal formulations are thought to be safe, well-tolerated, and to have few known adverse effects. Patients frequently favour natural remedies because of their perceived safety and natural origin. Combining herbal formulations with traditional treatments can increase their effectiveness and lessen their negative effects. In order to guarantee uniformity and predictability of results, standardisation of natural remedies is essential. For herbal compositions to be shown safe and effective in treating dermatitis, extensive clinical trials are required. To clarify how herbal bioactive components work in dermatitis, more research is required. For dermatitis, herbal formulations impart a useful adjunct or equivalent to traditional therapies. A trend towards more natural and integrative strategies to skin health may occur as research into the benefits of herbal therapy continues.

**COMPETING INTEREST**

All the authors declared that there is know competing interest in any kind related to this publication.

**AUTHORS’ CONTRIBUTIONS**

All the authors contributed equally and actively for the preparation of manuscript.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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